

MEIGS. (J. F.)

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COLLAPSE OF THE LUNG AND CYANOSIS

IN A  
YOUNG INFANT,

PRODUCED BY VIOLENT CRYING, IN WHICH THE SYMPTOMS WERE  
SUCH AS TO CAUSE A SUSPICION OF OPIUM-POISONING;  
WITH REMARKS ON THE NATURE AND TREAT-  
MENT OF TEMPORARY CYANOSIS FROM POST-  
NATAL COLLAPSE OF THE LUNG.

BY  
J. FORSYTH MEIGS, M.D.



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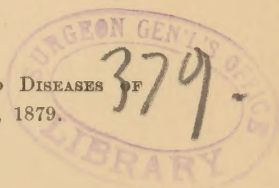
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NATAL COLLAPSE OF THE LUNG.<sup>1</sup>

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J. FORSYTH MEIGS, M.D.

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ON Monday, April 9th, 1877, I was sent for to see a young infant said to be alarmingly ill. Arrived at the house at 11½ A.M., and found an infant four weeks old, quite healthy at birth, and nursed by a healthy mother. From birth to the evening of Friday, April 6th, the child had been quite well. It had always nursed naturally, and had had three or four abundant, smooth, well-concocted yellow stools each day, and had seemed healthy in every respect. During the night of the 6th, it had been restless and had cried violently. It was supposed to be colicky, and no one was alarmed. On Saturday, the 7th, it was uneasy, and cried a great deal, and also through the following night. On Sunday, it still cried very much, but as there was no other sign of ill-health, and as the child nursed, and continued to have the bowels moved freely and naturally, it was not thought to be seriously ill.

On Sunday, the 8th, as the supposed colic with the frequent crying continued, the monthly nurse, without consulting the physician, gave at 12 M. 10 drops of Dewees' carminative. At 9 P.M. of that day, no relief being obtained, the nurse gave 15 drops more. This second dose was followed by some relief, as the child was easier and more quiet up to 11 P.M. It began then to cry again, and continued to do so until 6 A.M. of Monday, the 9th. The mother, who was a most intelligent person, though without experience, as this was her first child, told me that the baby "screamed most violently and continuously." The nurse said that the child "yelled" all night, but said afterwards that it would drowse for a little while, and then "yell" most violently for long periods. At 6 A.M. of Monday, there having been no rest through the night, the nurse gave 15 drops more of the carminative. After this the child slept upon the lap, and refused the breast. At about half-past ten o'clock, the baby was put into its usual warm bath. It was listless and drowsy through all this, and, at the close of the bath, whilst being dressed, was observed to be curiously pale and white over the whole body, looking like a person in a faint. Soon after this she became livid in color, had hurried and frequent breathing, and both nurse and mother became greatly alarmed, thinking the child might be dying. They sent at once for the accoucheur, for myself, or for any physician they might be able to find. They stopped a physician in the

<sup>1</sup> Read before the Obstetrical Society of Philadelphia, September 6th, 1878.

street, and when I reached the house, at 11½ A.M., this gentleman was there. He told me that he found the child very pale, with scarcely any pulse at the wrist, and looking very ill. A mustard plaster had been applied to the chest, and, as it had reddened the skin considerably, was removed.

On examination I found it looking pallid, but not blue at all. The breathing was short, feeble, and uneven; the pulse was frequent and weak, but could be felt distinctly; the pupils were contracted to a very small size, and the eyes motionless.

At first view of the case, after hearing of the Dewees' carminative, and observing the drowsiness and contracted pupils, I thought it was one of overdosing with opium—that either the carminative had been stronger than usual, or that more had been given than was intended. When I suggested this fear, the nurse broke down in great despair, and the mother was deeply distressed. Upon going over the history more carefully, however, and reflecting that nine hours had elapsed between the first and second doses, and nine hours between the second and third doses, and that between the second and third doses the child had screamed most furiously and continuously, I felt convinced that, if real narcosis were present, it must be the result of the last dose alone. The last dose had consisted of 15 drops only, and I began to think it impossible that this small quantity could have produced such an effect. The first two doses, containing 25 drops, had caused no narcosis. How could then one of 15 drops determine it?

Dismissing from my mind, therefore, the theory of narcosis, I thought at once of collapse of the lung, post-natal atelectasis, of which I had seen several examples in children of a few days or a few weeks old, with symptoms much like those here present.

The child was now lying quietly on a sofa. I passed a finger gently into the mouth. It was not grasped by the tongue as it ought to have been, but was merely nibbled at in a feeble way. I had the patient lifted carefully and gently upon a pillow and placed upon the mother's lap, and told the mother I wished to see whether the child could or would nurse. I selected the left breast in order that the child's heart might have free play in the act of nursing. At first no notice was taken of the breast. I then had the mouth held gently, but with some persistence, at the nipple, and the nipple inserted between the lips. The child now tried apparently to make an effect at suction, but, suddenly, the head was thrown back stiffly on the neck, and the body was stretched out with a convulsive movement. The face was distorted, being drawn towards one side, the breathing became labored and irregular, and the body assumed a dark livid color all over. In fact, there was a manifest attack of cyanosis with convulsive stiffening. I lifted the child as quietly as possible from the lap, and, having an inclined plane of about 15° formed of pillows, laid the body carefully on the right side upon this plane, and gave strict orders that it should not be disturbed in the least from this position for several hours. Presently the dark color passed away, and the body became pale. The respiration was short and feeble, the face dull and passive, and the mouth and eyes were



closed. There was no sign of coryza, and no nasal nor faucial rattle; the pupils continued very much contracted. I added ten drops of brandy to two teaspoonfuls of breast-milk, and poured a few drops into the mouth. Each time that I did this, the child moved, threw back the head, and the face was drawn upwards and outwards in a strong grimace. This was a slight convulsive movement, and was repeated several times within an hour—indeed, whenever the child was at all disturbed. I made a mèche of soft cambric rag, wetted it with the milk, inserted it between the lips, and left it there, telling the nurse to wet it afresh from time to time, by dropping a little milk upon it from a teaspoon.

At 12½ P.M., the child was doing well; lying quietly on the side, looking pale, and now and then sucking at the wetted rag. At 1½ P.M. no change; no spasmodic movements nor blueness. Treatment to be continued.

At 3 P.M., I was sent for to meet the accoucheur who had arrived. This was a gentleman of the largest experience, and one whom I often met in consultation. He had already examined the patient, inquired into the antecedents of the case, and announced his opinion that it was one of narcotism from the opium contained in the carminative, so that he was impressed, as I had been, with the strong resemblance of the symptoms to those of opium-poisoning.

Just before this the bowels had been moved. The stool was unlike any one the child had had since its birth. It was small in quantity, yellowish in color, and consisted of a thin feculent matter, intermixed with a large proportion (about half) of tough, stringy mucus, and a good many small rounded, undigested lumps of caseine. It was much more offensive, too, than usual. It was the first of the kind, the mother said, the child had ever had. Previously they had always been smooth, yellow, perfectly well concocted, without mucus or lumps of caseine, never greenish, never fetid, but having the light odor which belongs to the dejections of a healthy infant. The character of this stool explains, I think, the violent crying of the three days before the cyanosis set in. It showed that the child had had a fit of indigestion from some cause. There was a lientery of undigested caseine, and as a consequence, catarrh of some part of the intestinal mucous membrane with colic and pain.

The child was still lying quietly on the side, but was nursing gently through a small india-rubber tube attached to a shield which fitted over the mother's nipple. We directed that perfect rest in the same position should still be maintained. The baby was to be allowed to nurse for two or three minutes at a time, once in an hour, the breast having first been partially emptied by a breast-pump. At 9 P.M., all going on well, the child composed, and breathing more freely and naturally.

April 10th, 9 A.M.—Doing well; a quiet night without crying or disturbance; nursing now well from the breast, but restricted to a few minutes once in an hour. Had had in the night another stool, of the same kind as the one above described—mucous, offensive, with small undigested lumps.

Evening.—Child seems quite well. Had had one stool since the

morning. It was bright yellow, smooth, of the consistence of thin gruel, considerable in amount, without lumps, and of the natural odor. We agreed now that, if there should be any return of the crying, the child should have ten drops of brandy in warm water, and should that fail to quiet the pain, a teaspoonful of the following mixture, every two hours:  $\mathcal{R}$  Sodæ bicarb., 3 ss.; Tr. opii camphorat., gtt. xl.; Tr. rhei dulc., gtt. lxxx.; Syrup., 3 ij.; Aq. menth. pip., 3 xiv. M.

From this time forwards the child remained well, and, in August, 1878, it was a fine, well-grown, healthy infant.

*Remarks.*—The case just detailed is an interesting, and even an important one. It shows how difficult a thing diagnosis may be. For here an infant, four weeks old, supposed to be in good health except for a sharp colic, for which the nurse is ashamed to send for the physician, became suddenly dangerously ill, and developed a series of phenomena so much like those of opium-poisoning as to suggest that diagnosis to two experienced physicians. So strong was the resemblance of the condition to that of opium-poisoning that my friend was disposed to maintain throughout the case that it must have been the result of the doses of Dewees' carminative. For myself, I soon became convinced that the amount of opium contained in the carminative was quite too small to cause dangerous narcosis, and that, moreover, the symptoms, when carefully analyzed, were not those which belong to opium-poisoning.

It is easy to imagine the terror and distress of the nurse, and the horror of the mother, when they were told that the case was one of overdosing with opium, and the comfort they felt when I was able to assure them that, in my opinion, the dangerous symptoms were not the result as I had at first feared, of the doses given by the nurse, but of a morbid condition of the lungs and circulation to which very young infants are occasionally liable. In the one case, the child, should it die, would have been killed by the nurse; in the other, it would have died by the hand of God.

I can very well understand how the first opinion I formed was that of opium-poisoning. The child was drowsy and stupid, and had been so for several hours; it had refused the breast, had had a convulsive seizure, and had taken several doses of a carminative containing opium. But, on more careful study of the history of the case, I learned that nine hours had elapsed between the first and second doses without any sign whatever of



opium action, and that nine hours had elapsed also between the second and third doses, and that during this time the child, so far from being stupefied as from opium, had screamed, or, as the nurse said, "yelled" for a number of hours. The third dose was then given, and it was after this that the infant became quiet and drowsy, then, after the bath, very pallid as though in a fainting state, and after this, convulsed, blue in color, and apparently dying. If, therefore, the condition was one of opium-poisoning from the carminative, it must have been the last dose which had produced all these dire results. Moreover, how suppose that, if the first dose of ten drops, and the second of fifteen, had caused no sign whatever of opium action, the third of fifteen drops could act with such intensity? There could have been no cumulative action of the two first doses, as nine hours had passed between the first and second, and nine hours after the second, without a sign of narcotic influence. To make it at all probable that the third dose was the cause of the symptoms, I should have been obliged to suppose that the nurse either deceived me as to the quantity she had dropped, or had been herself deceived, and given a much larger dose than she thought.

I found, moreover, on careful calculation, that the amount of laudanum in Dewees' carminative was not more than three-eighths of a drop in ten drops of the carminative, and five-eighths in fifteen drops, so that the child could not have taken more than a drop and a half of laudanum in the whole thirty-five drops of the carminative administered, and that the whole amount had been distributed over a period of nearly twenty-four hours.

But, not only were the doses of opium insufficient in quantity, and given too far apart to produce dangerous narcotism;—other conditions were present opposed to the theory of opium-poisoning. The respiration and circulation were both frequent and feeble—they are usually slow in opium-poisoning. Movement and agitation of the body, instead of being beneficial, as in opium coma, developed new and dangerous symptoms, to wit, cyanosis and convulsive phenomena. Previous to my first visit, what first alarmed the mother and nurse was the effect of the disturbance necessary in bathing the child at half-past ten o'clock. Before the bath, the child was heavy and

lethargic, and it would not nurse. During the bath, it was listless and dull, and, at the close, became very pale, as though in a fainting state, and then grew livid. It was this condition which gave rise to the fear that it was dying. An hour later, when I arrived, it was lying quietly on a sofa, without the appearance, at first glance, of dangerous illness. The face was still, the respiration rapid and high, the pulse frequent and very small (indeed the physician who was present stated that it was nearly extinct when he first felt it), and the pupils contracted. When the child was moved, at my request, gently, to the mother's lap, to try whether it would nurse, the result was a sudden development of cyanosis, grimaces, gasping, and stiffening of the body—the very effects of movement which I had seen several times before in cases of cyanosis from collapse of the lung, and certainly not those one should expect to see in opium-poisoning. The contraction of the pupils, which was one of the striking symptoms, and one of the most frequent and marked in opium coma, occurs in other forms of disease of the nerve-centres besides poisoning by opium, and may be explained in this case on other principles, as I shall attempt to show further on in the discussion of the case.

Dismissing then, on these various grounds, the theory of opium-poisoning as the cause of the symptoms in the case, how are we to explain the cause and nature of this alarming and sudden illness—an illness which had nearly proved fatal to the child, and which had so much the appearance of opium-poisoning as to suggest that explanation to two competent physicians?

I believe that the symptoms were the result of the violent crying which had been continued, off and on, for two days and three nights, and which had for its cause colic pain, induced by a fit of indigestion. This crying had, in my opinion, induced finally such exhaustion of the respiratory muscles as to cause collapse of a portion of the lungs, and collapse of an amount sufficient to determine obstruction of the pulmonary artery, overloaded right heart, empty arteries, and such diminished supply of arterial blood to the nerve-centres as to establish anemia of those centres, and so coma, convulsion, contracted pupils, and the various phenomena which looked so much like opium-poisoning.

If this opinion be a correct one, it is certainly an important

fact for the medical practitioner, since he might otherwise, in such a case, assert opium-poisoning and so injure the reputation of an innocent nurse, or cause a cruel and unnecessary wound to some family. But as all this is, so far, only my own explanation of such cases, I desire to call the attention of the Society to some of the reasons on which I base this opinion, and to explain, in some detail, what I conceive to be the mode in which violent crying may produce this result. I will first quote the history of two cases which I had seen prior to the one described this evening. In one of these, the cyanotic attacks followed so directly upon violent crying that I think no one can doubt the relation of cause and effect between the two conditions. In the other, though the crying was not so violent, I could, at the time the case occurred, discover no other cause.

In the first case<sup>1</sup> a female infant, which had been perfectly well at birth, and up to the moment of the attack about to be described, was put suddenly into a bath by the nurse, on the eighth day after birth, directly after it had waked from sleep. The child, not yet properly awake, was greatly terrified, and began to scream violently. Instead of removing the infant from the bath, the nurse persisted in holding it immersed in the water for some minutes. It became deeply blue and convulsed, it frothed at the mouth and nose, seemed to be suffocating, and appeared to be dying. These symptoms continued for three-quarters of an hour, when they gradually passed away, and it fell into a heavy sleep. When I saw the child, soon after this, the only signs of disorder that remained were unusual paleness, drowsiness, and an expression of feebleness. Some three hours later, it waked, nursed, and from that time continued well. The only directions given were, no more bathing for some time, and slow, careful handling.

The second case is as follows :<sup>2</sup>

In the spring of the present year, I attended a lady in her confinement, who gave birth at full term to a healthy boy, weighing between nine and ten pounds. The child was perfectly well in every respect when born, and gave no disquietude up to the sixth day after his birth. On that day he cried a good deal in the morning. At one o'clock in the day, he began to moan, and seemed distressed, so that the mother asked whether he was not ailing. Just before 2 P.M. whilst in the nurse's lap, he ceased moaning, became bluish, and seemed to lose his breath, so that the nurse thought he was dying. She immediately placed him in a warm bath, and sent for me. The bath restored his respiration, the blueness passed away, and he looked much better, though he continued

<sup>1</sup> Meigs and Pepper, *Dis. of Children*, 6th ed., p. 135.

<sup>2</sup> *American Journ. of Med. Science*, January, 1852, p. 94.



to breathe irregularly and unevenly. A short time after this, he again became blue, and breathed slowly and irregularly, but had no spasm. A neighboring physician was called in, and ordered a repetition of the bath and a bottle of medicine of some kind. Shortly before 4 o'clock P.M. I arrived, and found the child lying upon the lap of the nurse, and just beginning to have another one of the paroxysms which had caused so much alarm. The whole of the exposed surface, the head and neck, and the arms, hands, and feet, were bluish. As I looked at the patient, the color of the skin, especially that of the head and neck, became more and more blue, and at last almost black, so that the child looked more like the child of a black than of a white woman. At the same time, the head was drawn backwards and to one side by a tonic muscular spasm; the arms and legs were extended and rigid, and the fingers were flexed in the palms of the hands. The respiration was slow and imperfect, and the child seemed as though about to die in the convulsion. This condition lasted for some moments, after which the convulsive state subsided, but the child remained bluish and in a state of stupefaction.

There was nothing in the history of this case that allowed me to refer the symptoms to any other cause than obstruction to the pulmonary circulation from collapse of the lung, and perhaps a reopening of the foramen ovale from the congestion of the right side of the heart, brought about by the partial arrest of the current through the branches of the pulmonary artery. There was no derangement of the digestive function, nor was there any sign, even the least, of a catarrhal condition to explain the symptoms. I concluded, therefore, that the case was one of sudden collapse of some portions of the lungs, with consequent congestion of the right side of the heart, and, perhaps, reopening of the foramen ovale and admixture of the two kinds of blood. I told the mother that there was no indication for any medicine; that all we could do was to place the infant on its right side, on an inclined plane of pillows, in order to let the heart have full play, and to give every half hour five drops of brandy in a teaspoonful of breast-milk. He was not to be disturbed from this position for several hours for any object whatever.

My directions were accurately complied with. In a very short time the color of the skin began to improve, and, though there were two slight paroxysms of convulsive stiffening with increased depth of the cyanosed tint, between this time and the evening, I found the child much better in all respects at my evening visit. There was still, however, some blueness, with irregular, short respiration, and with a continuation of the dulness and inattention. During the early part of the night the breathing was short and uneven, and attended with some moaning; but about 4 A.M. these symptoms disappeared, the child fell into a natural, easy sleep, lasting until 7 A.M., when it waked, nursed without any difficulty, and seemed quite well.

The child recovered perfectly, and is now (October 29th, 1851) in fine health.

It seems to me quite plain that, in the first of these cases at least, the violent crying and subsequent collapse of the lung and asphyxia must have been cause and effect. In the second case, the crying was not so marked, but it had recurred, and if it were not the cause of the subsequent collapse, I know not to what other cause to ascribe the illness.

For myself, I find no difficulty in understanding the mode in which violent crying may produce, in very young infants, the results witnessed in these three cases. Why one infant shall suffer so seriously from this cause, whilst a large majority escape, I do not attempt to comprehend.

In seeking, then, an explanation of this accident to the child, I recollect, first, that the young infant has but just issued from its intrauterine life, during which life the forces by which the act of breathing is to be established had been, so to speak, sleeping. At birth these forces enter at once into activity. This new activity is dependent, in all its wonderful arrangements for the pulmonic circulation and the aeration of the blood, upon the respiratory muscles. Unless these muscles enter upon their due and healthy contraction, life is impossible. Their play renders possible the new route for the circulation, and calls into active use myriads of blood-channels and air-cells which had before been closed.

It is not unreasonable to suppose that the new organisms, thus suddenly called into action, may retain, for a time, some memory of their previous condition, that their working may be feeble and imperfect, and that so they may tend to return the more readily, during the first weeks of life, to their fetal state. The muscular apparatus in particular must be feeble at first and more prone than afterwards to exhaustion. Violent crying can be effected only by an amount of muscular work far beyond what the ordinary vital work of respiration demands. Such crying may wear out and exhaust the muscles of breathing just as the locomotor muscles of the hunted hare or over-driven horse are worn out. When this occurs, the thorax is no longer expanded as in healthy breathing; portions of lung, not receiving the due amount of air, collapse, and in the collapsed portion the blood-vessels must be more or less obstructed. Should the respiratory muscles enter suddenly into inertia—faint, so to speak—the child might die suddenly, or in a very short time.

But so far as my experience goes, this does not happen, and yet such a sudden fatality was not far off, perhaps, in the first case quoted in this paper.

How does collapse of the lung induce cyanosis and the various concomitant dangerous phenomena present in the cases described? Evidently by establishing what Dr. Moreton Stillé, in his admirable thesis on cyanosis, published in 1844,<sup>1</sup> demonstrated to be the chief factor in the morbid condition, to wit, a condition of which *contraction of the pulmonary artery may be taken as a type*. Dr. J. Lewis Smith, of New York,<sup>2</sup> generalizes the same condition in the following words: "Cyanosis is due to vices or defects in the organism, usually congenital, which prevent the free and regular flow of blood to, through, or from the lungs."

It is not necessary for me to go into a study of the various theories of cyanosis. These concern rather those cases in which there is malformation of the heart or great vessels at birth, congenital defects which are absolutely incurable. I have to deal only with a condition developed in children healthy at birth, and of perfect formation, as shown by their perfect recovery at the time from the symptoms, and by the fact that they do not afterwards develop any sign of malformation.

It is clear that the blue color seen in my patients is the result of congestion of the venous system determined by an impediment to the circulation through the lung. But what is the cause of the convulsive movements, the drowsiness or coma, and the contracted pupils? The key to all this was explained by my father, Dr. Charles D. Meigs, in 1850.<sup>3</sup> The cause is to be found in the loss to the cerebro-spinal axis of the oxygen which is supplied to it by the arterial blood. Dr. Meigs says (page 104): "I shall proceed to show that the cerebro-spinal axis in man is inert and powerless, nay lifeless, inanimate as of itself; and that it depends upon the influence of oxygen for its power to manifest itself in its life-phenomena."

The phenomena present in these cases are, then, the results of diminished supply of arterialized or oxygenated blood to the brain and spinal marrow. Whether we suppose, as some

<sup>1</sup> American Jour. of Med. Sciences, July, 1844, p. 25.

<sup>2</sup> See Diseases of Children.

<sup>3</sup> See Observations on Certain of the Diseases of Young Children, Phila., 1850.



do, that in asphyxia caused by obstruction to the pulmonic circulation, the capillaries between the pulmonary artery and pulmonary veins, or the smallest terminal branches of the pulmonary artery, contract upon an unchanged venous blood, and refuse it a passage in the left side of the heart; or suppose, as other writers do, that the venous blood does pass, in asphyxia, through the lung and reaches the left side of the heart, the result is the same. The nerve-centres no longer receive arterial blood or receive but scant supplies. A child in this condition is in a state like that of the animal whose carotid and vertebral arteries have been ligated by the experimenter. This experiment, which has so often been performed, always induces instantly, insensibility, coma, and convulsion. Even contraction of the pupils is noticed at first in these experiments. Kussmaul and Tenner<sup>1</sup> state that when the supply of blood to the brain is cut off by ligating the innominate artery and the left subclavian beyond the left carotid artery, "immediately after the stoppage of the blood, the various sphincter muscles of the face contract, especially, and in a very striking manner, those of the iris and eyelids." This is the first effect upon the iris. After a time, however, when the violent convulsions, which always result from this experiment appear, the pupils became uncommonly enlarged.

Contraction of the pupils, which was so strongly marked in the case related in this paper, and which was the symptom which most strongly aroused the suspicion of opium-poisoning, may occur in any condition of disease which paralyzes the cilio-spinal centre in the upper part of the cervical spinal marrow. Erb<sup>2</sup> says that irritation of the nerve-fibres from the cilio-spinal centre causes dilatation of the pupil, while paralysis of those fibres causes contraction. Dr. Samuel Wilks, in his recent work,<sup>3</sup> does not write as decisively on this point as Erb does, but, at page 243, in speaking of the "heat-centre of the so-called cilio-spinal region," he says that this part has some influence over the eye through the sympathetic, and mentions a case of "fracture through the seventh cervical vertebra where the pupils were minutely contracted." Again, at page 435, in

<sup>1</sup> On Epileptiform Convulsions from Hemorrhage. Sydenham Soc. Ed., p. 14.

<sup>2</sup> Ziemssen Cyclop., New York, 1878, vol. xiii., page 142.

<sup>3</sup> Lectures on Dis. of the Nervous System, Philadelphia ed., 1878.

some remarks on local paralyses, under the head of the pupils, he states that the radiating fibres of the pupil are supplied with motor filaments which run into the cervical sympathetic, and that pressure on this nerve, as in cases of tumors of the neck, will cause contraction of the pupil. He states also that "in those fatal cases where blood has burst into the ventricles or diffused itself over the brain, the pupils are often minutely contracted, just as they are in cases of effusion into the pons." I may state in this connection that, in this very month (Sept., 1878), I had a patient, an adult man, who had been brought to the Pennsylvania Hospital by a policeman, having been found insensible in the streets. The man was quite insensible at first, lying almost motionless, in coma, with both pupils very much contracted. I found that he had chronic Bright's disease, and from the low specific gravity of the urine, the presence of large hyaline and partially granular tube-casts, and of cystic collections, crystals of urate of soda at the elbow and about the finger-joints, I concluded that he had the gouty contracted kidney. On the third day, the patient could be made to hear a loud voice, he gave his Christian name, and had distinct right hemiplegia, fully developed. The pupils remained contracted until atropia was placed on the eye-ball, and even then they did not dilate as they ought to have done. He died on the fourth day, and at the post-mortem examination, advanced cirrhosis of the kidneys was found, with a large effusion in the left lateral ventricle of the brain, partly liquid, and partly coagulated. This had broken up the structure of the corpus striatum to a great extent, and had injured a portion of the thalamus.

So it would seem that conditions which paralyze the functions of the upper part of the spinal marrow, and the region about the fourth ventricle, give rise to contraction of the pupils. Certainly we may look upon the more or less completely paralyzing action of asphyxia from temporary collapse of the lungs, which cuts off the supply of arterial blood to the nerve-centres, as sufficient to explain the contraction of the pupils in the case before us.

I desire to call the attention of the Society to the curious effects produced in these cases, so long as the cyanotic state lasts, by any irritation or disturbance which calls the muscular system into action. The child behaves somewhat like a patient suffering from

tetanus or hydrophobia. In some of the cases I have seen, and very notably in the one described in this paper, the least movement—lifting the child, changing its position, putting it, even in the gentlest possible manner, to the breast, the touching of the lips at first with a spoon—brings on irregular contractions of muscles, stiffenings, and when the movement is at all sudden or considerable, will develop a fit of cyanosis.

*Treatment.*—The only treatment that I have ever seen do any good in these cases, or indeed, in any of the forms of cyanosis of new-born or very young infants, is one which, so far as I know, was devised by my father, Professor Chas. D. Meigs, about the year 1840, and which was first published by him in the second edition of the “Philadelphia Practice of Midwifery” in 1842.

This treatment is simply one of rest in a certain position. The child is to be placed, whenever it presents the signs of cyanosis on the right side, on an inclined plane of from 15 to 30 degrees, the head and shoulders being directed towards the higher part of the plane. Another rule, quite as strict as the position, and one as important, is this: that the child is not to be removed from this position for several hours, or for two or three days, or not until the livid color, the stupor, and the tendency to convulsive movement have disappeared, if happily the case be found to be one in which these conditions can disappear. My own rule is, to order the child not to be moved, not to be touched even, except in the gentlest manner, for twelve, twenty-four, or forty eight hours.

That this treatment is sometimes successful I feel it quite right to assure the Society. It has succeeded in some five or six cases in my own experience, and Dr. Chas. D. Meigs gives quite a number of cases in his own practice, and in that of others, in his works on Obstetrics and in one on Certain of the Diseases of Young Children. The very simplicity of the treatment may be one reason why it has been so little noticed by writers on diseases of children.

Dr. Chas. D. Meigs based the treatment on the idea that the chief cause of cyanosis was a patulous state of the foramen ovale at birth, or a re-opening of that orifice in the first weeks of life. He supposed that, when the child was placed in the position described, the auricular septum becomes horizontal,



whereby two conditions were obtained which tended to prevent the passage of the venous blood of the right heart into the left auricle. One is that the blood, in this position of the body, has to be projected against gravity; the other, that the valve on the left side of the foramen ovale is pressed downwards against the orifice by any blood that may be contained on the left auricle. Whether the explanation be right or wrong it matters not, if it be true that the position is followed by beneficial results. That the treatment can do any permanent good in cyanosis depending on malformations of the heart, such as cause the incurable forms of cyanosis, is manifestly impossible, but that it is useful in the form of cyanosis described in this paper I have myself no doubt.

My own opinion is that the good derived from this procedure is the result of very simple causes. In the first place, the position on the right side gives the feeble and over-burdened heart the freest possible space for its play. Second, the elevated position of the body is one which all patients, or nearly all patients, with dyspnea, instinctively assume; and third and last, the perfect rest enjoined stops all the coddling, and dandling, and cooing, which frightened mothers and nurses are so apt to use in all dangerously ill babies.

The strange tendency to renewal of the gasping and convulsive movements, which form so essential a part of the cases described in this paper, is lessened, and, as these cases show, sometimes successfully removed. It can do no harm in any case to place a feeble and gasping child on the right side, and order it not to be moved for one, two, or three days. If it be necessary to disturb it to change the napkins, this should be done in the gentlest and the slowest way.

The child should be fed, in the mean time, from a teaspoon, or allowed to suck a rag moistened with breast-milk, or to try, as in the case described above, a flexible tube attached to the mother's breast. A little brandy, five or ten drops, ought to be given every two or three hours whilst the exhaustion continues.



